ECE 101
Information Technology for Electrical Engineers

Lecture 1

INTRODUCTION

by

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Outline

• Objectives of the Course
• Administration of the Course
• Blackboard
• Terminology and Definitions
• Structure of the Course

Important Note
Students must register for both lecture and lab. ECE 101 does not satisfy any IT minor requirements. IT minors must register for IT 101.
Objectives of the Course

ECE 101: Information Technology for Electrical Engineers (3:3:1) *

- Introduces fundamental concepts in information technology that provide technical underpinning for state-of-the-art applications.
- Presents fundamental engineering skills and perspective on range of information technology through lectures and hands-on experiments.
- Discusses ethics, professionalism, historical development, and social implications of IT.

* University Catalogue 2008-09
http://www.gmu.edu/catalog/courses/ece.html

Objectives of the Course*

- To introduce some basic terms and concepts of Information technology and Electrical Engineering
- To introduce Information Technology as a key and integral part of Electrical Engineering
- To introduce different aspects of Electrical Engineering
- To introduce societal implications of IT and EE including ethics and professionalism

* From the lecture notes of Prof. Aksoy.
Course Material

• The textbook for the course is
• Lecture notes will be posted in PDF form on Blackboard before the lecture.
• They will be posted in two formats: full page for seeing on a computer display screen and two-per-page handout form for printing.
• Homework assignments will be posted on Blackboard with information about submission format and deadline.
• Miscellaneous reading and/or support material will also posted on Blackboard.
• The Blackboard portal for ECE 101 also supports Elluminate!

Course Procedures

• Please read the flyer posted on Blackboard under ‘Syllabus’ section for course policies and procedures to be followed.
• **Student Evaluation Criteria:**
  – Midterm #1 20%
  – Midterm #2 20%
  – Homework 15% *(6 to 7 Assignments)*
  – Final 25%
  – Laboratory 20%
  *(Students may also earn bonus points in quizzes and other miscellaneous curricular activities.)*
• All examinations will be in-class, closed-book at the scheduled date/time, clearly marked on the Blackboard Calendar.
• The instructor and the teaching assistant are always available for any course related help they can render to make this course a good learning experience for ALL of you.
Course Procedures

Lab Session

• Follow the lab policies provided by the lab instructor / Teaching assistant. The flyer will be posted on Blackboard
• The lab grade is given according to the following criteria:
  – Lab reports: 25%
  – Mid-term: 30%
  – Final: 40%
  – Attendance, participation & lab conduct: 5%

Blackboard

• Go to http://courses.gmu.edu
• Enter Blackboard ID and password:
  Students need a Blackboard ID and password to login. Your
  Blackboard ID is your Mason email user name (e.g. the Blackboard ID
  for jdoe@gmu.edu would be jdoe).
• If you do not know your Mason mail user name, go to
  http://mail.gmu.edu and click on “Activating My Account” icon, and
  follow the steps.
• For homework assignments requiring electronic submission:
  – All assignments have due dates and submissions after the due date/time
    will not be possible, since Blackboard will automatically block the “submit
    my homework” option.
  – From time to time, Blackboard works too slowly. Since Blackboard access
    may not be as efficient as needed all the time; you are encouraged to
    submit your work earlier than the deadline.
  – If for some reason you need to submit your homework late (with
    permission from the instructor) you may submit it as an email attachment.
Terminology*

Science
- A body of knowledge
- Seeks to describe and understand the natural world and its physical properties
- Scientific knowledge can be used to make predictions
- Science uses a process – the scientific method – to generate knowledge

Engineering
- Design under constraint
- Seeks solutions for societal problems and needs
- Aims to produce the best solution given resources and constraints
- Engineering uses a process – the engineering design process – to produce solutions and technologies
- Is the application of scientific principles to practical ends through the use of analysis and judgment

*From the website of Museum of Science, Boston, MA. http://www.mos.org

Technology
- The body of knowledge, processes, and artifacts that result from engineering
- Almost everything made by humans to solve a need is a technology
- Examples of technology include pencils, shoes, cell phones, and processes to treat water

In the real world, these disciplines are closely connected. Scientists often use technologies created by engineers to conduct their research. In turn, engineers often use knowledge developed by scientists to inform the design of the technologies they create.

*From the website of Museum of Science, Boston, MA. http://www.mos.org
Science, engineering, and technology are all situated in a larger society that determines what science and engineering get done. Human values, needs, and problems determine in large part what questions scientists investigate and what problems engineers tackle. In turn, the technological products of science and engineering influence society and change human.

* From the website of Museum of Science, Boston, MA. http://www.mos.org

“For the core competency of universities is not transferring knowledge, but developing it…” John Seely Brown
Another Way to Look at IT

- **ICS PHASE**
  - Learning of BASIC KNOWLEDGE AND PROBLEM SOLVING SKILLS, i.e., Mathematics, Physics, Electronics

- **ING PHASE**
  - Learning of DOING – deliverance of promises of the profession, i.e., Modeling, Designing, Manufacturing, Planning

- **TION PHASE**
  - COLLECTION of Activities for which the profession has been designed, i.e., Communication, Transportation, Sanitation
  - Key Player: Human Values

**KEY FACTORS**
- BASIC KNOWLEDGE AND SKILL
- CREATIVITY AND DESIGNING ABILITIES
- PROPER RESPECT TO HUMAN VALUES

*From some unknown source.*

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System Architectures Laboratory
The Impact of New Discoveries

A new discovery (scientific and/or technological) sometimes brings about a sea change in both the basic knowledge and the design principles supporting it.

- For example, the last century has seen four stages of change*:

<table>
<thead>
<tr>
<th>TRANSITION</th>
<th>Change in Basic Knowledge</th>
<th>Change in Design Principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power to Vacuum Tubes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Vacuum Tubes to Solid State</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Devices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discrete to VLSI</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed to Programmable Environment</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* From some unknown source.

What should one expect to learn in a course with a title, ‘Information Technology for Electrical Engineers’? 
Information Technology is: “the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware.”

In short, IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and retrieve information, securely.

Information Technology Association of America
Some Areas of Study in EE

- Communications (including Telecommunications and Networks)
- Signal Processing
- Computer Engineering
- Control Systems
- Electromagnetic and Microwaves
- Electronics
- Photonics
- Power Engineering
- …
Structure of the Course

Lecture Session
- Basic Definitions and Terminology
- Basics of Electricity and Electrical Circuits
- Information
  - Types,
  - Creation,
  - Representation and Storage,
  - Manipulation,
  - Transmission, and
  - Recovery of Information
- Social Impact of Information Technology

Lab Session
- Introduction and Orientation to the Equipment
  - Tool-kit for Electrical Engineers
- Experiments on Basics of Electricity and Electrical Circuit Components
- Experiments with Devices that are commonly used in Information Systems
  - E.g., Sensors, Digital Gates, Switches, Amplifies, etc.
- Introduction to Some Software Tools used for Designing Information Systems

The experiments may both supplement and complement the material presented in the lecture sessions.
Summary

• We looked at the course objectives
• We discussed issues related to the course administration
• We looked at some basic definitions and tried to justify the course structure and its contents in view of the prescribed objectives.
• We will start our study of the basics of electricity in the next lecture and move on to the aspects of electrical engineering that deal with the creation, storage, manipulation, transmission, and recovery of information.